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COMMAND AND CONTROL IN A
JOINT OPERATIONAL ENVIRONMENT:

THE HYBRID CONTROL MAXIM

By

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A paper submitted to the Faculty of the Naval War College in
partial satisfaction of the requirements of the
Department of Joint Military Operations.

The contents of this paper reflect my own personal views and
are not necessarily endorsed by the Naval War College or
the Department of the Navy.

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8 February, 2000

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ABSTRACT

Will the technology of netcentricity affect the organizational structure of joint military organizations such that the organizational hierarchy becomes flattened and the command, control, coordination, and communication of the organization becomes more centralized?

Centralization of command, control, coordination, and communication may be effective and efficient in a simple organization that is flat--horizontal--and operates in a simple environment because knowledge of the entire organization is not as specialized. The techniques, however, that are effective and efficient within a simple structure may not be effective or efficient in a more complex organization, such as a joint military organization.

A joint military organization, such as a Unified Command, is a highly complex organization, incorporating highly specialized professionals; diverse occupational structures; and highly specialized knowledge, which operates in a highly differentiated environment. Effectiveness and efficiency cannot be achieved through following only one organizational model. There is no one best way to organize a joint force for the purpose of achieving the highly varied goals within a highly varied

environment or geographic region. A joint military organization must attempt to deal with the ends and means of organizational structure, resolve organizational ambiguity, satisfy organizational communication needs, and determine the appropriate positions of authority.

The very nature of organizations requires some form of hierarchy once the organization moves beyond a very small size, simple technologies, and low levels of complexity.

Organizational ambiguity and its affect on organizational structure can be applied to a joint operation. The long-range development of formal organizations and institutions—like a Regional CINC—is less a product of intentions, plans and consistent decisions than of ongoing adaptation to changing problems (as a direct result of ambiguity) with available solutions within gradually evolving structures of meaning.

In a joint operating environment, commanders at every level of warfare find themselves worrying primarily about three things. First, whether or not they will be informed about significant events that affects their operations. Second, whether or not they will be able to transform the information they receive into sensible and timely decisions. And third, whether or not they can get

their decisions executed in time to affect the outcomes of their operations. These commanders can quickly find themselves overloaded with an inordinate amount of data that could impair their decision making ability, not enhance it. To create a more effective and timely flow of information, some sort of filter or fusion system between the collection point and the decision-maker (i.e. hierarchy) should be inserted.

There are primarily two reasons why a joint operational command should consider decentralization over centralization: planning and execution. Details of planning vary from echelon to echelon. It is clear that at the strategic (unified command) level, military command will be unified (centralized), but the closer one gets to the tactical (CJTF) level, the more forces will expect to fight as part of some smaller unit; commanded by a more service / tactical oriented (decentralized) command element.

To create an organization that is capable of dealing efficiently with crises without impairing its long-run capabilities, the joint military organization should be structured as a flexible organization where it is possible to establish task forces rapidly. To maintain long-run efficiency, the peacetime organization should be structured as a highly differentiated unit. The task

forces should be structured as small, highly differentiated units, with maximum flexibility for the commander.

Therefore, in order to attain the highest levels of coordination, effectiveness, and efficiency within a joint military command organization, a *hybrid* system of command and control, which encompasses an appropriate mixture of hierarchy and flatness, and centralized and decentralized control must be established.

Introduction

Organizations are established, defined, and constituted by people--human beings with all their attendant flaws and complexities. No organization will ever be perfect, any more than any human being is ever perfect.

Thomas P. Coakley, Command and Control for War and Peace

Throughout the current literature concerning military command decision making and organizational theory and structure the conception is expressed that modern information technology will radically revolutionize and transform military command organizational structure from one of vertical hierarchy toward one of horizontal flatness. These writings emphasize increasing span of controlⁱ, flattening hierarchies, freeing information flow, increasing the speed of command,ⁱⁱ and taking advantage of new computer technology to reduce the time for beginning combat operationsⁱⁱⁱ, all of which will increase combat effectiveness and efficiency^{iv}. But is this current conception of technology as the prime mover for organizational structure correct? Is this theory of control (primarily one of centralized control) correct? Do these theories of organizational structure and control apply to a joint operational command structure?

If the answer to the preceding questions is "no," then what should become the appropriate maxim for control, and how should this maxim be applied to a joint operational command structure? This paper will address this question and attempt to clear up a common misconception that equates command and control with equipment or technology. It will also demonstrate that technology is not the major "cause" of organizational structure, but that external conditions and internal processes are the dominant factors determining the form of an organization.

Complex organizations, like that of a Regional CINC, contain many subparts requiring coordination and control, and the more complex an organization is, the more serious these issues become. While command may be facilitated by the application of technology, the dominant characteristic of the command function is its human dimension.

This research paper will be divided into four topics of discussion: (1) C2 Organizational Structure; (2) Organizational Ambiguity; (3) Communications, and (4) Centralized vs. Decentralized Control. It will then contrast vertical and horizontal differentiation and finally present a maxim of command and control applicable to a joint operational environment.

C2 Organizational Structure

What an organization does affects its structure, in terms of both size and occupational specialization.

Richard H. Hall, Organizations: Structure and Process

What are the determining axioms for organizational structure? Organizational structure serves to minimize or regulate the influence of individual variations and ensure individual conformity to the requirements of the organization. It also serves to exercise power, establish decision-making positions and control the flow of information^v.

In 1965, Jerald Hage, created an "Axiomatic Theory of Organizations," where he detailed four organizational ends or goals, four organizational means, and two propositions and corollaries based on this theory^{vi}. (See Appendix A)

How do these theories of organizational structure relate to the development of a joint organization? First, with respect to means, the very nature of organizations requires some form of hierarchy once the organization moves beyond a very small size, simple technologies, and low levels of complexity. Second, a highly differentiated organization, like a joint organization, operating in a highly differentiated environment (air, land, sea, and

space) will develop highly differentiated knowledge specialists and should therefore decentralize control in order to maintain effectiveness. Third, effectiveness is not achieved through following one organizational model. There is no one best way to organize a joint force for the purpose of achieving the highly varied goals within a highly varied environment or geographic region. Fourth, organizations with many joint programs are more complex organizations, that is, they are more highly professionalized and have more diverse occupational structures. Fifth, with respect to hierarchy of authority:

The ideology of military decision making emphasizes the imposition of order through organization and command and the importance of clarity, coherence and comprehensiveness.^{vii}

And sixth, with respect to strategic choice:

It is ultimately within the mind of the commander that all information--about goals, enemy and friendly forces, the environment, logistics, and so on--combines with the commander's own background and perceptions to provide the basis upon which decisions about force employment are made. This is true whether the commander is supported by personal knowledge only, the advice of staffs, or by complex data banks.^{viii}

In conclusion, a joint military organization, such as a Unified Command, is a highly complex organization, incorporating highly specialized professionals; diverse occupational structures; and highly specialized knowledge, which operates in a highly differentiated

environment. Therefore, in order to effectively and efficiently command this joint organization, the Joint Commander should develop an organizational structure which maximizes the benefits of horizontal, vertical, and spatial differentiation and balances the centralization of control, coordination, and communication within each department to enhance integration, innovation, and conflict resolution.

Organizational Ambiguity

One goal of the C2 [Command and Control] . . . process is the achievement of a timely reduction of uncertainty, with the objective of facilitating intelligent decision making.

Frank M. Snyder, Command and Control: The Literature and Commentaries

One of the principal tenets of network-centric warfare is that netcentricity will help reduce the fog and friction of war so that it will no longer make sense to devote scarce resources to restrict information within an organization.^{ix} This presents the two questions of (1) whether and (2) how ambiguity affects organizational structure.

Captain Wayne P. Hughes and Roger Weissinger-Baylon argue that there will always be ambiguity, especially in combat. In military decision making,

because there is a persistent tendency for problems and solutions to be linked by their simultaneous availability, ambiguity is directly related to the element of time. "Timeliness, ever present timeliness, intrudes on the commander because decisions made are not decisions effected."^x Roger Weissinger-Baylon believes there are three types of ambiguity in military organizations: ambiguities in technology, preference, and participation, and that all three imply uncertainty for command and control. Ambiguity of technology results when organizations do not understand their own process. In other words, they do not understand the decision-making options available and the linkages between alternatives and their likely consequences or outcomes. Ambiguity of preference results when decision-makers preferences are unclear, heterogeneous, changing, or discovered as the decision unfolds. And finally, ambiguity of participation results when decision-makers move in and out of individual decision arenas or vary allocated energies and attention.^{xi} These types of ambiguity answer in the affirmative the question of "whether or not ambiguity affects organizational structure." The question of "how" is answered also; ambiguity affects the decision-making process. Captain Hughes asserts that any commander making decisions in combat, when faced with ambiguity

(uncertainty) must still make a commitment of force based on this incomplete information. "The genius of combat decision making is knowing when to commit . . . An inferior timely decision is better than a perfect decision too late."^{xii}

In conclusion, ambiguity and its affects on organizational structure are relevant to the structure of a joint operation. The long-range development of formal organizations and institutions, like a Regional CINC, is less a product of intentions, plans and consistent decisions than of ongoing adaptation to changing problems (as a direct result of ambiguity) with available solutions within gradually evolving structures of meaning.^{xiii}

Communications

Whether it takes place primarily in the mind of a commander or over a computer network linking the president, CINCs of the operational commands, and battlefield commanders, the C2 process has its own identity, independent of any technology involved.

Thomas P. Coakley, Command and Control for War and Peace

The topic of communications goes to the heart of network centric warfare and its conception of affect on organizational structure. Most network centric theorists

would agree with Chester Barnard's claim that communication holds the central place in organizational theory because the structure, extensiveness, and scope of the organization are almost entirely determined by it.^{xiv} This section will address how communications affect structure and its application to the joint operating environment. The view will be presented that the centrality of communications varies according to where one is looking in the organization; whether one is looking from the perspective of the Combatant Commander, Subordinate Commander, Component Commander, or Joint Task Force Commander. "The closer one gets to the organizational center of control and decision making, the more pronounced is the emphasis on information exchange."^{xv}

Harold Wilensky submits that there are four factors for determining communication importance: (1) the degree of conflict or competition with the external environment; (2) the degree of dependence on internal support and unity; (3) the degree to which internal operations and external environment are believed to be rationalized; and (4) the size and structure of the organization, its heterogeneity of membership and diversity of goals, and its centrality of authority.^{xvi} By applying the analysis from the first two topics of

discussion-organizational structure and ambiguity-it can be deduced from these four factors that communication is most important in organizations and organizational segments that must deal with uncertainty; that are complex; and that have a technology that does not permit easy routinization. Therefore, the more people and idea oriented an organization is, the more central communications become.

In a joint operating environment, commanders at every level of warfare find themselves worrying primarily about three things: whether or not they will be informed about significant events that affect their operations; whether or not they will be able to transform the information they receive into sensible and timely decisions; and whether or not they can get their decisions executed in time to affect the outcomes of their operations.^{xvii} Communications and information flow are crucial to each one of these commanders; however, delivering vast quantities of data rapidly to these decision-makers-especially in time-compressed and emergency situations-will only overload them. These commanders often need only particular pieces of the available information rather than mountains of data, therefore, to create a more effective flow of information, this potential overload problem can best be

eliminated through the proper placement of some sort of filter or fusion system between the collection point and the decision-maker. What is this effective filter or fusion system? In organizations with *highly trained* or *professional* personnel, studies found that a tall hierarchy was associated with effectiveness. Hierarchy contributes greatly to accurate, clear, and timely communications and coordination, as well as providing a continuous source of error detection and correction. ^{xviii}

Centralized vs Decentralized Control

Decisions made at the scene of action are the true test of the command and control process at all levels of command.

Frank M. Snyder, Command and Control and Decision Making

One of the Principles of War is "Unity of Command" or "Unity of Effort." Does this also refer to unity or centralization of control? Or is it actually more effective and efficient to balance the forces and tasks of a joint operational command in order to attain "an equal strain on all parts?"^{xix} This section will investigate the centralization or decentralization of control and its resulting impact on joint operational command.

Historically, the command and control process has taken place in a hierarchical structure at every level of command. There is, however a common misconception that regards this activity as a single, vertically continuous process when it should be viewed as a multi-tiered series of closed loop (yet interdependent) processes at every echelon of command. In other words, the output from one level provides the input or tasking at the next level. As the command and control structure works its way down the chain of command, the number of commanders involved separately (but not independently) in this process increases both vertically and horizontally. Each commander directs his forces on the basis of mission and tasking and on the dual observe, orient, decide, and act loops of his own and enemy forces. The complexity of activities within each echelon differs considerably. In the end, the command and control processes and systems that support the entire process are not creatures of modern technology--rather the C2 systems themselves are a natural manifestation and product of the need to direct and control forces effectively and with true economy of force. Though modern technology may facilitate decision making, it cannot substitute for the wise choices made by the decision-maker himself.^{30x}

There are primarily two reasons why a joint operational command should consider decentralization over centralization: planning and execution. Details of planning vary from echelon to echelon. At the unified command level, planning consists of consolidating the requirements of the CINC and participating forces; determining the best workable solution; obtaining assets and determining priorities for limited assets to meet shortfalls; and issuing the directions for establishing the command, control, and communications (C3) architecture, all the while building to ensure the required C3 interoperability between the component forces. At the component level, planning consists of determining the deploying forces' ability to operate within the desired area of operations. At the CJTF level, planning consists of creating the available courses of action, schemes of maneuver, and methods of employment and mission accomplishment. All of this takes place concurrently, and only through the decentralized, yet coordinated efforts of all the planners does the process work.^{xxi} On the execution side, historical experience has shown that the force-level decision-making process has no comparability to the tactical situation. In crisis situations, the commander on the scene must be left alone to accomplish his mission. Yet, this on-scene commander

cannot see the broader picture available to policy makers both up and down the chain and in Washington, DC. Historically, it has required a higher level echelon commander to focus on the operational picture, another commander to focus on the strategic impacts and still another to properly focus on the prioritization of investment strategies; force levels, modernization, readiness, and sustainability.^{xxii} All of these differing perspectives reflect span of control. The proper application of the principle of span of control is possible only when each commander at every level balances the elements—individuals, distance, and time—with their own knowledge, ability, and capacity.^{xxiii} Since a commander's span of control is not unlimited, organizations are arranged hierarchically, but at each level some fraction of the energy of decision resides in the commander at that echelon. As a result, with respect to communications, the narrower the span of control, the faster the horizontal information flows.

In conclusion, it is clear that at the strategic (unified command) level, military command will be unified (centralized), but the closer one gets to the tactical (CJTF) level the more forces will expect to fight as part of some smaller unit that is commanded by a more service / tactical oriented (decentralized) command element.

"Who was in charge of making the abort decision? It was the operational commander, the one out there on the scene, the one confronted with the real situation, who made the decisions. He was the person given the authority and responsibility to make that final decision to abort."^{xxiv}

Why not flat? The problems with a flat, or "market" organizational structure.

Michael Cohen and Kathleen Carley have invested considerable research into the question of which is the most effective and efficient organizational structure for the military: hierarchy or flatness. This section will provide a brief contrast between the two structures and their applicability to joint operational environments.

First, Michael Cohen's conclusions will be presented. In a flat, or, market organizational structure, there are many possible pair-wise relations of mutual change between actors. In a hierarchical structure, every actor but one is subordinate to the authority of exactly one other actor. Theoretically, all persons in a flat structure have equal access to the superior, and consequently, the superior must be able to understand what all his subordinates are doing in order to communicate with all of them. Therefore, conflict resolution and coordination are slower in a flat structure. Hierarchies are built with authority as its

fundamental relation. A hierarchical authority system is better at preventing the appropriation by individuals of the benefits of acting opportunistically, is better at auditing, and is better at adjudicating disputes. Hierarchy helps guarantee coordination of activities, because everyone in the group gets, and knows what the others get, decision premises from the same longer-time-horizon source. The bottom line is that hierarchy is more effective in situations with high needs for coordination and decision making.^{207v}

Three primary communications network types have been studied over the years; wheel, circle, and all-channel. Wheel networks operate such that all communications are sent from the periphery to the hub, therefore an imposed hierarchy. It is the task of the hub to do the coordinating. The circle network allows communications around the periphery, without priorities, therefore an imposed flat structure. The all-channel network allows maximum connectivity—everyone can communicate with everyone else. Using success in arriving at a correct solution as the criterion of efficiency repeated investigations have found the wheel network type to be superior because of hierarchy.^{207vi}

Kathleen Carley's research is very similar in its findings. Her research focused mainly on the efficiency

factor of differentiation within an organization. She concluded that differentiated (hierarchical) organizations tend to be more efficient than undifferentiated (flat) ones, both structurally and politically. She also noted that changes in the pattern of the amount of incoming information appeared to have little or no effect on either structural or political efficiency within the organization. (see Figures 1 and 2) From a military organizational standpoint, to effectively deal with crisis one should structure the organization such that it can rapidly move from a peacetime configuration to a crisis management configuration. The configuration chosen for crisis management should exhibit high levels of short-term efficiency regardless of what its long-term efficiency profile looks like. Assuming reconfiguration is impossible, then one should use the organizational structure that is highly efficient in the long run for very steady flows, and yet highly efficient in the short run for extremely altered information flows. Differentiated organizations are more efficient in the short run, and might be a little more efficient in the end. A possible reason here is that in a highly differentiated organization the chain of responsibility has been established such that most problems are dealt with at the lowest possible level (decentralization),

thus reducing the number of problems that the commander and subordinate commander's have to deal with. Thus, if an organization is to deal with crises efficiently, it should be structured as a small, highly differentiated organization. To create an organization that is capable of dealing efficiently with crises without impairing its long-run capabilities, the joint military organization should be structured as a flexible organization where it is possible to establish task forces rapidly. To maintain long-run efficiency, the peacetime organization should be structured as a highly differentiated unit. The task forces should be structured as small, highly differentiated units, with maximum flexibility for the commander. ^{xvii}

The Hybrid Control Maxim

The only way in the future we face--is to ensure that the technology we adopt contributes to expected missions. . . people are the most important element of any military capability. . . Even the most advanced C2 systems of the future must consider man's integration into the system. We--you and I--are the ultimate users of information and the primary designer and implementer of operations.

William J. Crowe Jr., A Perspective on the Command and Control Agenda

This paper has attempted to reveal that joint military operations are too one-of-a-kind to be improved simply through the flattening of hierarchy and the

centralization of control, even when using the modern technology of network centric warfare. A flat organization impairs coordination and a centralized system of control produces false loyalties to its own organization and the wrong measures of effectiveness.

Therefore, in order to attain the highest levels of coordination, effectiveness, and efficiency within a joint military command organization, a hybrid system of command and control, which encompasses an appropriate mixture of hierarchy and flatness, and centralized and decentralized control must be established.

Appendix A

Jerald Hage's "Axiomatic Theory of Organizations"

With respect to an organization's ends or goals, Hage considers (1) adaptiveness or efficiency; (2) production or effectiveness; (3) efficiency or cost factor; and (4) job satisfaction or morale to be the main parts of a conceptual model that views the organization as a system in and of itself. These goals are designed to involve more than just organizational output, they are meant to primarily reflect an organization's internal factors, with only minimal concern paid to external considerations. Adaptiveness and flexibility refer to an organization's ability to develop new techniques and operations internally as well as respond to influences externally. Production and effectiveness are internal considerations and reflect organizational output, especially with respect to increases over the previous years. Efficiency and cost factor are also internal measures designed to reflect organizational output. And finally, job satisfaction and morale are internal considerations measuring internal working conditions and turnover rate. Hage also presents four mediums, or means which are totally internal to the organization; (1) complexity or specialization; (2) centralization or

hierarchy of authority; (3) formalization or standardization; and (4) stratification or status.

Complexity or specialization reflects the number of occupational specialties and resulting levels of training and authority required supporting the work of the organization. James Price defines complexity as:

"the degree of knowledge required to produce the output of a system. The degree of complexity of an organization can be measured by the degree of education of its members. The higher the education, the higher the complexity."^{xxviii}

Organizational complexity has at least three elements in its definition; the number of occupational specialties, professional activity, and professional training.^{xxix} A high level of specialization will require coordination among specialists. This coordination can take place through three elements of complexity; horizontal differentiation (flatness), vertical differentiation (hierarchy), and spatial differentiation. Horizontal differentiation refers to the subdivision of the tasks to be performed among its members, giving highly trained specialists a rather comprehensive range of activities to perform and minutely subdividing tasks so that non-specialists can perform them (e.g. an assembly line). In vertical differentiation, authority is distributed in accordance with the level in the hierarchy. The higher the level, the greater the authority. In spatial

differentiation, activities and personnel can be dispersed in space according to either horizontal or vertical functions through the separation of power centers or tasks.

Three hypotheses and one paradox can be drawn from these elements of complexity. First, a high degree of differentiation (complexity) is therefore related to a highly complex and differentiated environment. The specific form an organization takes is dependent upon the environmental condition it faces. Added to this, of course, are the considerations of size, traditions, and idiosyncrasies of individual organizations. Second, increased complexity on the vertical and horizontal axes will do little to improve the performance of an organization structured around tasks to be performed and the technology available. If the tasks and technology were altered to develop a more effective system, the organization would become more complex. Third, effectiveness is not achieved through following one organizational model. In fact, there is no one best way to organize for the purpose of achieving the highly varied goals of organizations within a highly varied environment. The paradox is that while decisions to physically disperse, add dimensions, and add or subtract hierarchy levels may be made in the interests of economy,

the results may be counterbalanced by the added burdens of keeping an organization together. The techniques that are essential and efficient within a simple structure just may not be effective or efficient in a more complex case.^{300x}

Centralization or hierarchy of authority refers to the proportion of occupations or jobholders who participate in decision making and the areas in which they participate. The major defining characteristic of centralization is that power distributions are determined in advance. Centralization can refer to either individuals or units, such as divisions or departments within the organization. It also refers to levels within organizations, as when it is specified that only people of a particular rank have the right to make certain kinds of decisions. The degree of centralization of an organization indicates its view of its personnel. In a highly centralized situation the personnel are not trusted to make decisions or evaluate themselves. Less centralized situations indicate a greater willingness to permit the personnel to carry out their responsibilities in a more autonomous manner.^{300x1}

Formalization is another crucial means in organizational development. Formalization or standardization refers to the rules and procedures

designed to handle contingencies faced by the organization. Formalization is the organizational technique of prescribing how, when, and by whom tasks are to be performed. A highly formalized organization works within routine, similar to an assembly line; while a non-formalized organization deals constantly with new situations for which routines, or precedents, do not yet exist. Formalization and standardization combine with complexity and specialization to bring role specificity and power distribution to the forefront as an important organizational consideration. For example, in an organization characterized by routine work there is more likely to be greater formalization in organizational roles and personnel procedures, and a resulting decentralization of authority due to rigid conformity to these procedures. On the other hand, the presence of a well-trained, professional staff is related to a reduced need for extensive rules and policies. One of the hallmarks of professionalization is the ability and willingness to make decisions based on professional training and experience. Professionalization and formalization, however, are incompatible. Each are actually designed to do the same thing—organize and regularize the behavior of the members of the organization—but in different ways. In the end, the

organizational structure, the functional specialization and division of labor, and the formal reward system dictate the major content of a given office.^{xoxii}

And finally, stratification or status measures the differences in income and prestige among jobs and the rate of upward mobility allowed within the organization. From these ends and means, Hage develops a set of propositions and corollaries (see Table 1) which can be summarized as follows: (1) Organizations can be understood on the basis of these basically internal factors; (2) Factors other than the means and ends discussed have an effect on organizations.

It can also be concluded from Hage's work that organizations attempt to be rational, controlling their internal operations and environments to the greatest extent possible, and that external conditions and internal processes are the dominant factors determining the form of an organization.

Sociologists tend to agree that there are four factors that affect an organization's structure. The four factors are (1) Size; (2) Technology; (3) Environment; and (4) Strategic Choice. Size refers not only to the number of employees working within the organization, but also to the concept of organizational membership, organizational administration, and individual impacts

from and on the organization. The net result of increasing size in an organization is increased delegation or decentralization. Technology can be broken down into three components: operations, materials, and knowledge technology; principally, the techniques, materials, and the varying complexities in the knowledge system used in the workflow activities of the organization.^{xxxiii} The variety of tasks performed within an organization essentially reveals its multiple technologies and therefore the organization must structure itself differently according to the task.^{xxxiv} Environment refers to the social and physical environment outside the organization that has an impact on the development of the organization. Examples are custom, tradition, friendships or hostilities, and competition. The final factor is strategic choice, the technique by which organizations respond to their environment. John Child argues that internal politics determines the structural forms, environmental features, authority distribution, and performance standards within an organization.^{xxxv} Three strategic choices referring to the authority and distribution of power are; participative management, management by participation, and self-management. Participative management involves taking part in decision making, while both management by

participation and self-management involve workers taking over organizational management. The former is a functional form of decentralization that leads to greater efficiency and effectiveness, while the latter two forms are structural decentralization that leads to power equalization.²⁰⁰⁷¹

Efficiency by Differentiation

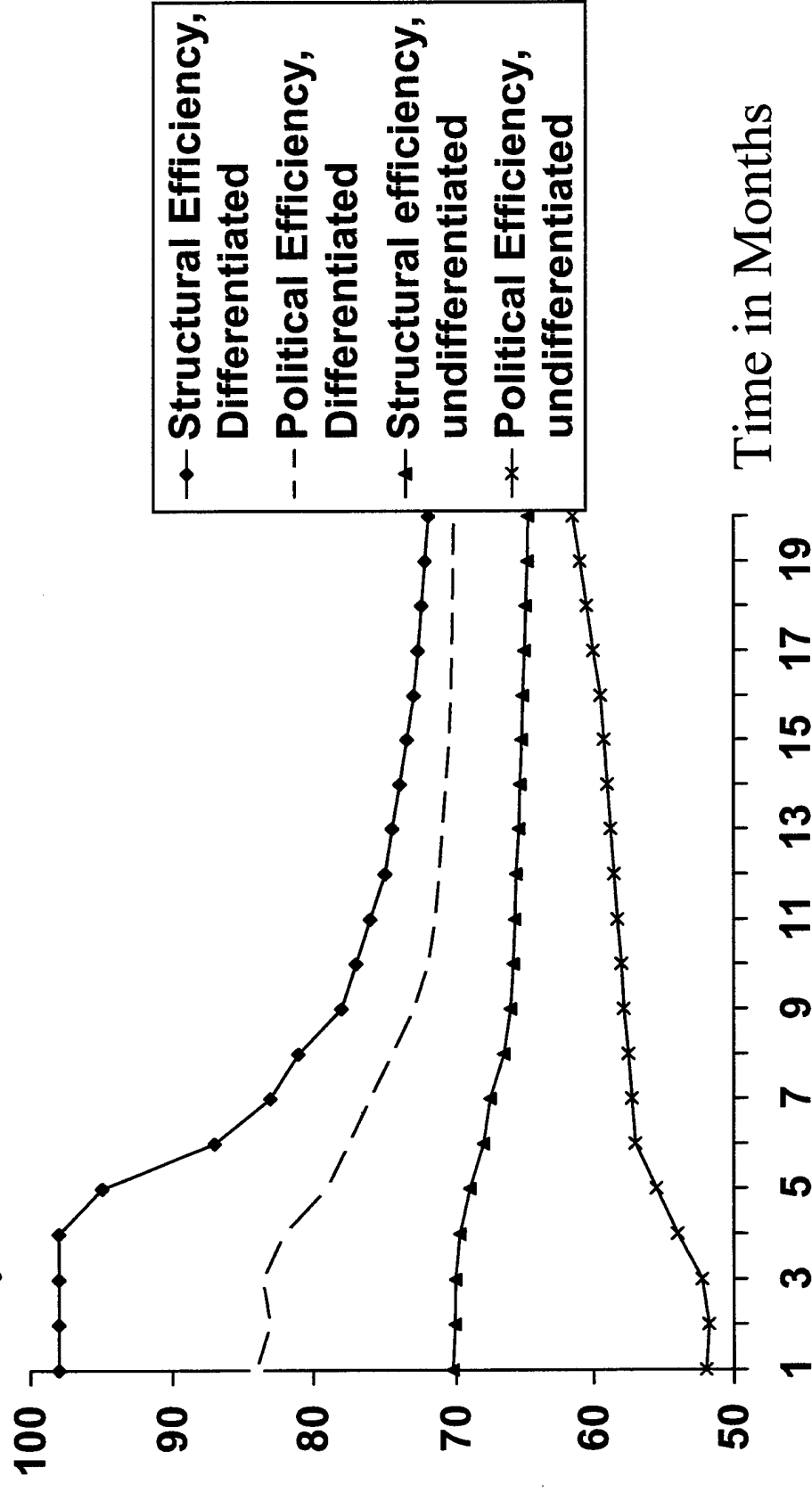


Figure 1

Efficiency by Amount of Information

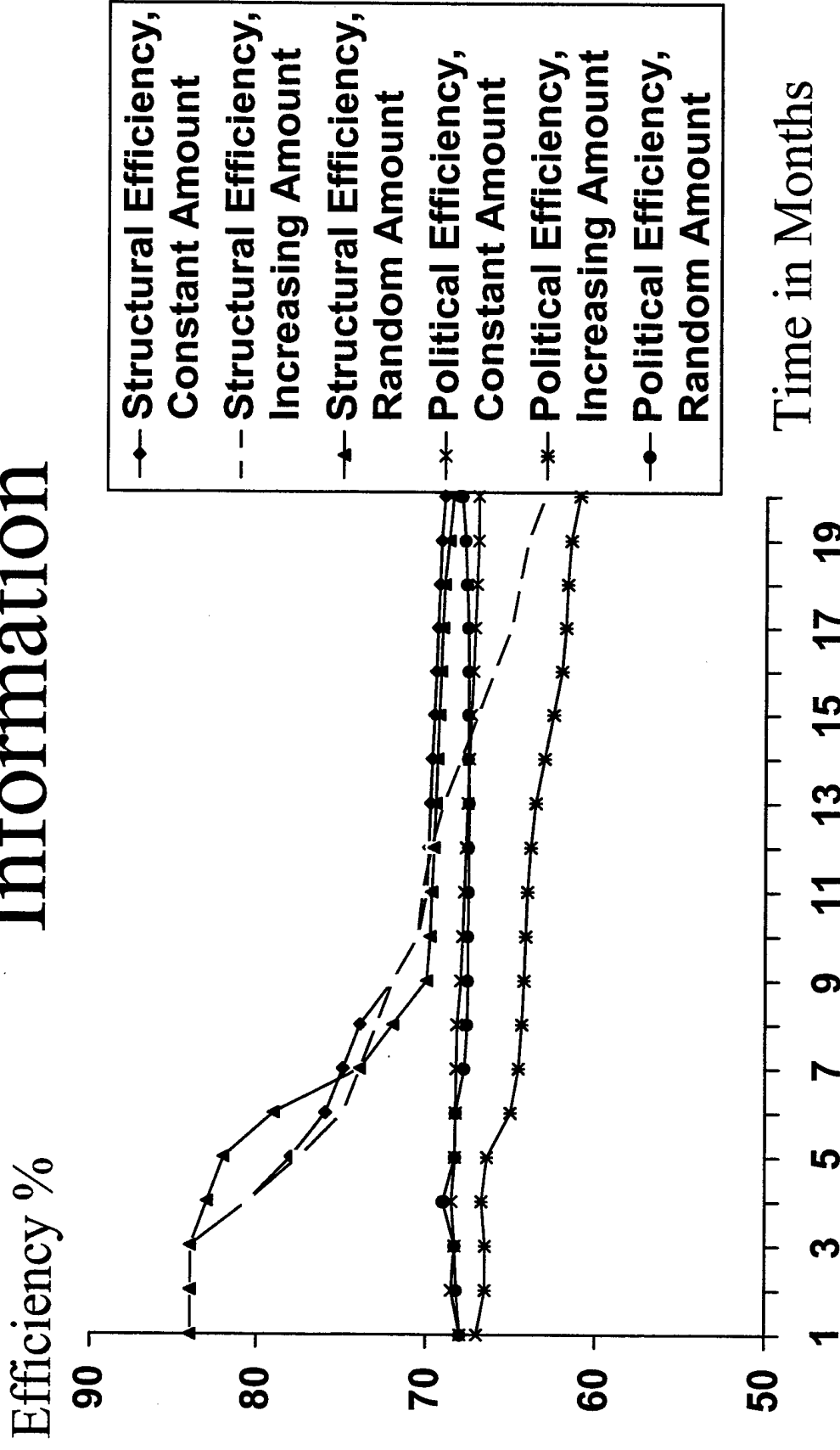


Figure 2

Table 1

An Axiomatic Theory of Organizations

Major Propositions:

1. The higher the centralization, the higher the production.
2. The higher the formalization, the higher the efficiency.
3. The higher the centralization, the higher the formalization.
4. The higher the stratification, the lower the job satisfaction.
5. The higher the stratification, the higher the production.
6. The higher the stratification, the lower the adaptiveness.
7. The higher the complexity, the lower the centralization.

Derived Corollaries:

1. The higher the formalization, the higher the production.
2. The higher the centralization, the higher the efficiency.
3. The lower the job satisfaction, the higher the production.
4. The lower the job satisfaction, the lower the adaptiveness.
5. The higher the production, the lower the adaptiveness.
6. The higher the complexity, the lower the production.
7. The higher the complexity, the lower the formalization.
8. The higher the production, the higher the efficiency.
9. The higher the stratification, the higher the formalization.
10. The higher the efficiency, the lower the complexity.
11. The higher the centralization, the lower the job satisfaction.
12. The higher the centralization, the lower the adaptiveness.
13. The higher the stratification, the lower the complexity.
14. The higher the complexity, the higher the job satisfaction.
15. The lower the complexity, the lower the adaptiveness.
16. The higher the stratification, the higher the efficiency.
17. The higher the efficiency, the lower the job satisfaction.
18. The higher the efficiency, the lower the adaptiveness.
19. The higher the centralization, the higher the stratification.
20. The higher the formalization, the lower the job satisfaction.
21. The higher the formalization, the lower the adaptiveness.

Limits Proposition:

8. Production imposes limits on complexity, centralization, formalization, stratification, adaptiveness, efficiency, and job satisfaction.

Endnotes

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